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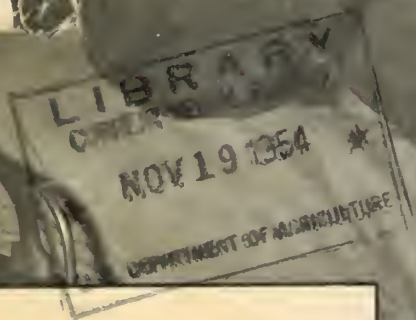
Fall Premium Milk Pricing Plans

By Norris T. Pritchard

FCS Circular 4

April 1954

(Formerly FCA Circular C-147)



Farmer Cooperative Service

U. S. DEPARTMENT OF AGRICULTURE

Washington, D. C.

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SUMMARY

A FALL premium plan is a special type of milk pricing plan which varies prices to farmers seasonally without corresponding variations in prices to milk distributors or consumers. The principal purpose of the plan is to provide price incentives necessary to induce dairy farmers, as a group, to produce milk in relatively uniform quantities throughout the year.

The first fall premium plan was conceived by milk producers shipping to Louisville, Ky., and started operating in that market in 1944. Since then at least 10 other markets have adopted similar plans. Although the 11 plans studied differ in many respects, all have 6 basic features in common:

1. Fall premium plans are additions to, and not substitutes for, use-classification and other pricing mechanisms in city milk markets;

2. premium funds are accumulated by withholding money from all producers in designated spring months when milk production normally is highest in volume;

3. premium funds are held for the benefit of all milk producers as a group;

4. a responsible official or organization is the custodian of the premium fund;

5. premium funds are distributed in designated fall months when milk

production normally is seasonally smallest in volume, and

6. producers share in premium payments on the basis of their fall milk deliveries irrespective of quantities of milk they delivered the previous spring.

Differences among the 11 plans studied (see table at end of summary) are explainable in part by differences among markets in seasonal milk production patterns and in other production and marketing conditions.

On the basis of such standards as necessity, equity, flexibility, and simplicity fall premium plans rate high. In terms of effectiveness in reducing seasonal milk production variations, experiences of the eight markets using the plans 4 or more years are not uniform. Also, it is not possible to measure how much leveling of seasonal delivery patterns was actually caused by fall premium plans beyond what leveling might have occurred in recent years without them. Managers of cooperatives and other leaders in these markets, however, are agreed that their plans have functioned successfully and intend to retain them. Also, there is evidence that several plans would have been more successful had accumulation rates been higher.

Analysis of fall premium and

Selected features of fall premium plans in all markets, 1952

Market	First year of operation	Accumulation months	Accumulation rates per cwt.	Premium months	Equal division of fund among premium months	Investment of premium fund	Seasonal variation in Class I prices	Govt. regulation	Market-wide pooling
Connecticut	1947	May, June	50¢	Oct., Nov.	Yes	No	No	State	⁸ No
Columbus, Ohio	1952	Apr., May, June, July	¹ 35¢	Oct., Nov., Dec.	Yes	Policy unknown	Yes	Federal	Yes
Denver, Colo.	1948	May, June	² 10¢	Sept., Oct., Nov.	⁹ Yes	No	No	none	Yes
Duluth, Minn.	1951	May, June, July	³ 8%	Oct., Nov., Dec.	Yes	Yes	Yes	Federal	Yes
Kansas City, Mo.	1946	Apr., May, June, July	40¢	Oct., Nov., Dec.	Yes	No	Yes	do	Yes
Louisville, Ky.	1944	Apr., May, June, July	⁴ 12%	Sept., Oct., Nov., Dec.	Yes	No	Yes	do	Yes
New Bedford, Mass.	1947	Apr., May, June	40¢	Oct., Nov., Dec.	⁶ Yes	Yes	No	State	Yes
Omaha, Nebr.	1952	Apr., May, June	³ 8%	Sept., Oct., Nov.	Yes	Policy unknown	Yes	Federal	Yes
Sioux City, Ia.	1947	May, June	20¢	Sept., Oct., Nov.	Yes	No	Yes	do	Yes
Topeka, Kans.	1948	Apr., May, June, July	40¢	Oct., Nov., Dec.	Yes	No	Yes	do	Yes
Washington, D. C.	1946	Apr., May, June	⁵ 50¢ ⁷ 75¢	Oct., Nov., Dec.	⁷ No	No	Yes	none	⁸ No

¹ Rate is applicable to Class I and II uses but not to Class III uses. ² Rate is 10 cents per pound of butterfat. ³ Rate is 8 percent of blend prices in accumulation months.

⁴ Rate is 12 percent of average of basic formula (manufacturing milk) prices of previous calendar year.

⁵ The 50-cent rate is applicable to milk deliveries in April and June; the 75-cent rate applies to deliveries in May.

⁶ Denver and New Bedford pay producers twice monthly. Premium funds are divided into equal daily shares and total premiums paid in a delivery period equal 15 or 16 daily shares. This is, in essence, equal distribution.

⁷ Premium monies accumulated in April are distributed to producers in October. Similarly, May is matched with November and June with December.

⁸ However, large producers' associations in these markets practice association-wide pooling.

seasonal class price plans reveals that the two plans are essentially equal in ability to vary milk prices to farmers seasonally and in simplicity of construction and administration. Fall premium plans may be superior in that they do not vary prices to distributors or consumers.

Fall premium and base-surplus plans can be about equal in effectiveness of providing incentives to producers to reduce spring in relation to fall milk production. Fall premium plans, however, are more simple to administer and to understand, more flexible, and less restrictive on producers and production.

How effectively a fall premium plan achieves its objectives will depend, in large measure, on its design. Each plan should be constructed to fit the conditions of the particular market in which it will operate. Before particular provisions of a plan are selected the designer should decide on (1) the nature of the seasonal price pattern necessary to achieve this goal, and (2) the extent of reliance upon the plan and other parts of the price structure to secure this price pattern. The designer can study past price and production data in his and other markets using premium plans to help make decisions on these basic problems.

The most important provision of a fall premium plan is the accumulation rate. A percentage-type rate, based on current blend prices or prices in some recent past period, is preferable to a fixed money rate. This is because percentage rates keep seasonal price ratios more nearly in line with changes in seasonal production costs

as general levels of prices and costs rise and fall. Rates probably should not be less than 8 percent of spring blend prices in most markets and even higher rates may be necessary in some cities.

Premium and accumulation months and rates should be selected so that the highest net prices will be paid milk producers when milk deliveries are smallest and the lowest net prices will be paid when deliveries are largest. Premium and accumulation periods of equal length are not necessary. It may also be desirable in some markets to have relatively long periods and to vary rates within them in order to achieve greater continuity in seasonal price increases and decreases.

The effectiveness of fall premium plans does not seem to be affected by the practice of paying premiums by special checks compared with adding premiums to regular monthly payments. Also, returns to milk producers are affected only slightly by the small interest income from investment of premium money during the interim between accumulation and disbursement.

Other conclusions reached in this study include:

1. Premium plans can function successfully in a market not regulated by a governmental agency and in a market pooling milk on an individual-handler basis provided that a single, strong producers' association is active in the market.

2. Accumulation and premium rates can be made applicable to either total milk uses or to Class I (fluid) uses only. In the latter case, rates must be higher because of the

smaller base to which they apply.

3. A premium plan can be added to a base-surplus plan to increase seasonal price incentives to producers, but this is an unnecessary complication of a market's price structure.

4. Producers should be paid premiums even if they delivered no milk during the previous accumulation period. To do otherwise would, in essence, base premiums on spring instead of fall milk deliveries and this would make a premium plan ineffective.

5. There are sound reasons for believing that premium plans are legal in both regulated and nonregulated markets even though the legality of the plans has not yet been tested in court.

6. A continuing educational program among producers is a necessary adjunct to a premium plan. In fact, keeping producers informed on how the plan operates and on how to take advantage of the incentives it creates may mean the difference between success and failure of a plan.

Fall Premium Milk Pricing Plans

by Norris T. Pritchard, Agricultural Economist

The Problem

WIDE seasonal differences between producers' milk deliveries and sales of fluid milk and cream to consumers have been a troublesome marketing problem in cities for many years. In recent years, too, population and sales of milk have increased greatly in many cities.

This combination of developments has forced many milk handlers and milk producers' associations to import milk from sources outside local milksheds to supplement inadequate local supplies in fall and winter months.

In these same years, large quantities of high quality milk regularly have been diverted from fluid to manufacturing uses in spring and summer seasons. In many markets, these imports and diversions could have been reduced materially, or even eliminated, had local dairy farmers produced and delivered milk in relatively uniform volumes throughout the year.

Costs of seasonal variations in milk production and deliveries fre-

quently are high. Transportation of milk from distant points to make up local deficits usually is costly. Local milk producers lose returns from sales through failure to deliver adequate supplies of milk in fall and winter seasons. Their returns are also reduced by diversion of milk in the spring from fluid to manufacturing uses. In addition, producers may be forced to absorb extra handling and transportation costs if this diversion requires shipments of surplus milk to distant points. Finally, assembly and processing costs may be higher when seasonal fluctuations in milk production are large than when they are comparatively small. This is because capacities of milk plants and hauling facilities must be adequate to handle huge volumes of milk each spring and are only partially utilized in other seasons.

Need for Plan

Seasonal Consumption Pattern

Sales of fluid milk and cream in most cities normally vary only slightly seasonally. Exceptions to this may include a few cities especially attractive to tourists. A typical city retail sales pattern

Note.—The author gratefully acknowledges the assistance of Donald E. Hirsch, now Chief, Dairy Branch, Farmer Cooperative Service, in reviewing and suggesting changes in the original manuscript.

exhibits a small but noticeable decrease in sales during the summer months between closing and re-opening dates of public schools. These are the months when many urban families take annual vacations away from their home cities. In other seasons, sales usually are slightly above average in volume.¹

Seasonal Production Pattern

Milk production, in contrast with consumption, fluctuates widely from season to season in most producing areas. It typically reaches a seasonal high in May or June and a seasonal low in one of the fall months. In some cities, spring milk deliveries may exceed fall deliveries by relatively small percentages, say, less than 25 percent. In some other markets, fall deliveries regularly are below 60 percent of spring deliveries.

Causes of Production Variations

Causes of seasonal fluctuations in milk production are both physical and economic. Among these, seasonal variations in numbers of cows freshening and in methods and rates of feeding probably are important.²

Available studies of milk production costs by seasons indicate that costs of producing 100 pounds of milk in fall and winter months are

well above spring production costs.³ Estimates are as much as 150 percent above spring production costs in some farming areas, but no more than 40 percent higher in others. Variations among individual farms within these areas probably are greater than differences among the area averages. The principal cause of these seasonal cost differences appears to be differences in costs of feeding during pasture and barn-feeding seasons.

Another cost factor which few milk production cost studies attempt to measure is the greater labor and managerial skill required to maintain a dairy herd on a fall or even-freshening schedule. More planning and supervision are necessary. Breeding troubles frequently are encountered. More skill is required in feeding cows in barns than on pastures. There is evidence, too, that farmers consider these difficult-to-measure costs when planning dairy enterprise operations.⁴

On the other hand, three physical and economic factors partially offset higher costs of fall-winter and seasonally even milk production. They are:

1. Fall and winter milk prices usually are higher than spring and

¹ U. S. Bureau of Hum. Nut. and Home Econ. *Seasonal Patterns of Food Consumption, City Families*, 1948. 17 pp. Spec. Report No. 3., p. 4. Washington, 1951; and Pritchard, N. T. *The Indianapolis Milk Market*. Purdue Univ. Agr. Expt. Sta. Bul. 554, p. 16, Lafayette (Indiana), 1950.

² New England Research Council, Subcommittee I. *Factors Affecting Seasonal Milk Production and Their Effect on Producers' Costs and Returns*. 32 pp. Maine Agr. Expt. Sta. Bul. 459, Orono, 1948.

³ Among the publications on seasonal production costs are: Wright, K. T. and Hodge, T. L. *Dairying for Profit in Southeastern Michigan*. 52 pp. Mich. Agr. Expt. Sta. Spec. Bul. 373, East Lansing, 1951; Downen, M. L. *Seasonal Costs of Producing and Marketing Fluid Milk in the Milkshed of Chattanooga, Tennessee*, 1949-50. 60 pp. Tenn. Agr. Exp. Sta. Rur. Res. Mono. 263, Knoxville, 1950; and Rhodes, C. S., and Wilcox, R. H. *Cost of Producing Milk in Northern Illinois*. 32 pp. Ill. Agr. Expt. Sta. Bul. 511, Urbana, 1945.

⁴ For example, see: Pritchard, N. T. *The Indianapolis Milk Market*. Purdue Univ. Agr. Expt. Sta. Bul. 554, pp. 26-9, Lafayette (Indiana), 1950.

summer prices. As a result, gross annual incomes of fall producers generally exceed incomes of spring and summer producers.

2. Cows freshening in the early fall receive a second stimulus to milk production from spring pastures which spring-freshening cows do not receive. For this reason, fall-freshening cows usually produce a larger annual volume of milk which tends to reduce average costs of milk production.

3. Fall-winter dairying permits more uniform seasonal distribution of labor than does spring-summer dairying. This is true because the peak labor load of the dairy enterprise comes in the fall and winter when other farm work usually is lightest.

Attempted Solutions

Milk producers, their marketing cooperatives, and milk distributors long have sought means of reducing seasonal differences in production and consumption of milk. Several

Milk production on farms varies from season to season in most of the producing areas.



types of programs have been, and continue to be, used singly or in combinations with, generally speaking, only limited success. The programs include: (1) Seasonal changes in retail milk prices; (2) educational and advertising programs among milk producers, and (3) special seasonal producer pricing plans. The principal types of plans (described later in this report) are: (1) Variable class price plans; (2) base-surplus or base-quota plans, and (3) fall premium plans. This study is concerned primarily with this third type of plan, often referred to as the Louisville Plan, the "take-off and pay-back" plan, or the fall incentive plan.

Objectives of Study

The principal objectives of this study are: (1) To describe fall premium plans now used in 11 metropolitan milk markets;⁵ (2) to measure the effectiveness of these plans, and (3) to evaluate particular provisions of the plans. It is hoped that this study will aid farmers, leaders of marketing cooperatives, and others in making choices between fall premium and alternative seasonal pricing plans, and, if the decision is to adopt a fall premium plan, in selecting the best provisions for it.

⁵ It was not possible to ascertain with certainty whether or not more than 11 markets are currently (1952) using fall premium plans. Information received from a reliable source indicates that St. Joseph, Mo., has had a fall premium plan for several years, but no data on this market were obtained. Also, trade magazine reports indicate that several upstate New York cities have been considering adoption of fall premium plans, but it is not known whether or not they have done so. This study, therefore, may not be complete in its coverage of markets using fall premium plans.

Sources of Data

Most of the data of this study came from records and reports of Federal and State milk market administrators and producers' associations in the markets using fall

premium plans. Additional information was obtained from State and Federal orders regulating milk marketing in these cities and by correspondence and interviews with leading men in these markets.

Fall Premium Plans

Fall premium plans are a special type of milk pricing plan currently (1952) used in 11 urban milk marketing areas: Columbus, Ohio; Connecticut (entire State); Denver, Colo.; Duluth, Minn.; Kansas City, Mo.; Louisville, Ky.; New Bedford, Mass.; Omaha, Nebr.; Sioux City, Ia.; Topeka, Kans.; and Washington, D. C. The primary purpose of these plans is to induce dairy farmers to increase fall in relation to spring milk production. In this respect, fall premium plans do not differ from other seasonal pricing programs. They do, however, differ in methods of achieving this aim.

The Louisville Plan

The first fall premium plan was conceived and developed by milk producers shipping to Louisville, Ky.⁶ The original Louisville Plan was proposed by the Falls Cities Cooperative Milk Producers' Association during hearings on amendments to Federal Order No. 46, regulating milk marketing in Louisville, in June 1943.⁷ The plan became a part of Order No. 46 in

August 1943, and began operating in 1944.

The original plan provided that a special premium fund be accumulated during the spring and that it be distributed to producers the following fall. The fund was built up by the market administrator by withholding from the money payable to all producers by handlers an amount representing 15 cents per hundredweight of milk received by handlers in each of the delivery periods of April, May, and June. In each of the delivery periods of September, October, November, and December, one-fourth of this fund was added to the total amount payable by handlers to producers. The net result was to increase differences between fall and spring blend prices. At the same time, prices paid by handlers and retail milk prices were not affected by the plan.

Plans in Perspective

Although a fall premium plan may be only a small part of the whole complex structure of prices in a city milk market, it is an important part. To understand fully its role in varying milk prices to farmers seasonally some knowledge of this complete pricing structure is needed.

⁶ Roberts, J. B. The Louisville Fall-Premium Plan for Seasonal Milk Pricing. 75 pp. Ky. Agr. Expt. Sta. Bul. 510, P. 33, Lexington, 1947.

⁷ U. S. War Food Admin. Docket #AO 123-A3, June 9, 1943.

Use-Classification Pricing

The essence of a use-classification plan of milk pricing is that milk distributors pay producers for raw milk according to the uses they make of it. At least two use classes are employed and three classes are common. In markets with only two classes, Class I typically includes all milk distributed by handlers as fluid milk and cream and other fluid milk products. Class II milk is milk used for manufacture of other dairy products. Class I prices are always higher than Class II prices even though the quality of milk used in the two classes may be the same.

Milk Pooling and Blend Prices

Prices received by milk producers are weighted averages of class prices paid by handlers. These producer or blend prices are computed by an accounting procedure known as pooling; actual physical pooling of neither milk nor money is essential to the pooling process.

In computing a blend price, several calculations must be made:

1. An accurate determination of the quantity of milk received by handlers is essential; and the sum of quantities used in the several use classes must equal total receipts.
2. The total amount of money handlers must pay is computed by (a) multiplying the quantity of milk in each class by the appropriate class prices (Class I uses times the Class I price, etc.) and (b) adding the values so computed.
3. The blend price is computed by dividing the total amount of money payable by handlers, item (2) (b), by the total volume of

milk received by them, item (1).
The following simplified example of a milk pool illustrates these computations:

Example I

Class	Quantity	Price	Value
I	500	\$5. 20	\$2, 600
II	250	4. 00	1, 000
Total	750		\$3, 600

Blend Price: $\$4.80$ ($3,600 \div 750$).

Seasonal Pricing and Milk Utilization

Since a blend price is the final result of a series of computations, any change in the basic data of a milk pool necessarily affects the blend price. Example II below shows the effect of an increase in the proportion of milk used in Class II with class prices unchanged:

Example II

Class	Quantity	Price	Value
I	500	\$5. 20	\$2, 600
II	500	4. 00	2, 000
Total	1, 000		\$4, 600

Blend Price: $\$4.60$ ($4,600 \div 1000$).

Changes in quantities of milk utilized, both in total and by classes, similar to those illustrated above, occur regularly from season to season in city milk markets.

Class I sales usually remain nearly uniform throughout the year because consumer demand for fluid milk products fluctuates little sea-

sonally and because distributors usually satisfy this demand completely before diverting milk to Class II uses.

Class II, as a result, is a residual class in which seasonal variations in uses may be extreme if seasonal fluctuations in milk deliveries to handlers are large. Since it is reasonable to assume that Example I is typical of a fall month and Example II of a spring month, it is apparent small seasonal variations in blend prices result from the pooling procedure itself.

Seasonal Pricing and Class Prices

If class prices also change seasonally, as they do under pricing formulae used in most markets, seasonal variations in blend prices are increased. Increasing the class prices in Example I, illustrative fall month, alters that pool as follows:

Example III

Class	Quantity	Price	Value
I-----	500	\$5.55	\$2,775
II-----	250	4.20	1,050
Total----	750	-----	\$3,825

Blend Price: \$5.10 ($3,825 \div 750$).

The difference between fall and spring blend prices has now been widened to 50 cents, comparing Examples II and III. Obviously, a greater variation in blend prices can be secured by increasing seasonal variations in class prices. Thus, in organized milk markets, some seasonal variation in blend prices results from two sources: (1)

Seasonal fluctuations in milk use patterns, and (2) seasonal fluctuations in class prices.

A Fall Premium Plan in Operation

One purpose of fall premium plans is to increase seasonal fluctuations in blend prices while avoiding large seasonal variations in class prices to handlers. In illustrating operation of a fall premium plan it may be assumed that Example II above represents the average of 3 spring months and that Example III represents the average of 3 fall months when the plan is in operation. Assuming a premium fund accumulation rate of 30 cents per hundred-weight of milk, the total amount paid producers each spring month is reduced by \$300 ($1,000 \times 30\text{¢}$), or from \$4,600 to \$4,300. This reduces the average net price to producers to \$4.30. This \$300 is held in the premium fund which at the end of the 3-month period totals \$900. In the fall, the fund is distributed to producers by adding one-third of it to the value of the milk received in the market in each of the 3 fall premium months. The total sum of money paid producers each of these months, as a result, is increased by \$300, or from \$3,825 to \$4,125. Dividing the larger amount by 750, the quantity of milk received in each fall delivery period, results in a blend price of \$5.50 instead of \$5.10. The fall premium plan, thus, increases the difference between average spring and fall blend prices from only 50 cents (\$5.10 minus \$4.60) to \$1.20 (\$5.50 minus \$4.30). At the same time, the plan has caused no changes in prices paid by handlers.

It is interesting to note that while

the spring accumulation rate is only 30 cents, the fall premium rate is 40 cents, a ratio of 4:3. The reason for this is simply that the ratio of spring to fall milk deliveries also is 4:3 (1,000:750). While the accumulation rate applies to 1,000 units of milk, the fall premium rate applies to only 750. The average premium rate will always exceed the accumulation rate in exactly the same ratio that total spring milk deliveries exceed total fall deliveries.

Basic Common Features

All fall premium plans currently in operation are variations on a central theme. To the credit of the originators of the first Louisville Plan, none of its six basic features have been altered in any material respect.

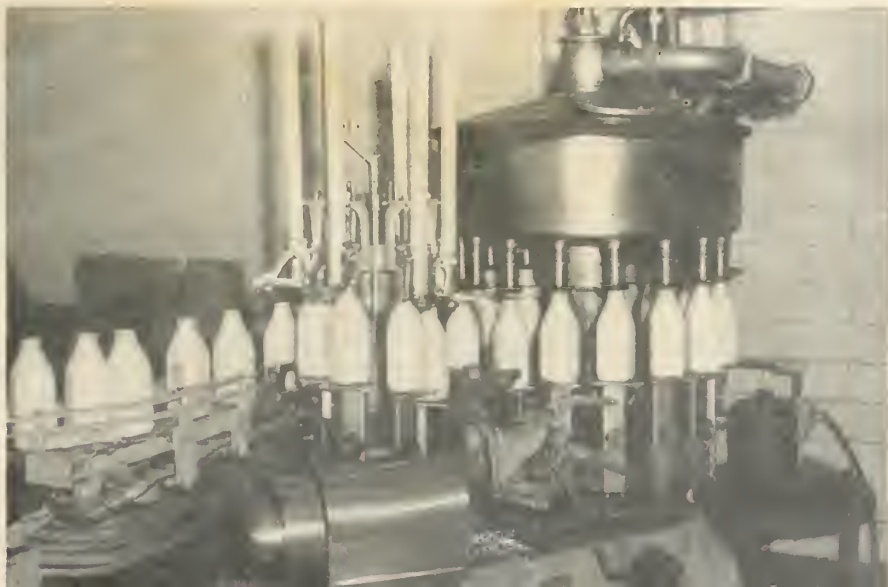
1. Fall premium plans are additions to, and not substitutes for, use-classification, milk pooling, and other pricing mechanisms in city milk markets. The plans do not alter class prices paid by handlers and, unless a plan succeeds in alter-

ing volumes of milk deliveries and thereby affecting class utilization patterns, it does not affect the total sum of money paid by handlers in any month or year. Although the plans increase seasonal variations in blend prices, they do not directly affect wholesale and retail milk prices.

2. Fall premium reserve funds are accumulated during prescribed spring months when producers' milk deliveries normally are seasonally greatest in volume. All plans prescribe in detail the methods by which premium funds are accumulated.

3. Premium funds are accumulated on a market-wide basis. There are no deductions from payments to individual producers as such, even though the effect is the same insofar as the amount of money actually received by a producer is concerned. Money accumulated under the plans, therefore, is not of the same status, in a legal sense, as money withheld under cooperatives' check-offs. In other words, a fall premium plan is a peculiar seasonal

Class 1 milk includes milk distributed by handlers as fluid milk and cream and other fluid milk products and usually brings the producer a higher price under a use-classification pricing plan.



pricing device, and no more than that.

4. Some responsible official or organization is designated in each plan as custodian of the fall premium fund.

5. Distribution of premium funds is made in months when producers' milk deliveries normally are seasonally smallest in volume. The plans prescribe in detail the procedures by which these funds are distributed.

6. Producers share premium funds in proportion to their fall milk deliveries exactly in the same manner that they share other money paid by handlers for milk.

Important Differences Among Plans

Even though basically similar, all fall premium plans operating in 1952 had a number of important differences. These differences involve all provisions of the plans and have important effects on the manner in which the plans function.

Fund Accumulation Periods

Premium funds are accumulated under all plans during May and June and within the four months of April through July. As the tabulation below indicates, the 11 markets are about equally divided among 2-, 3-, and 4-month periods.

<i>Period</i>	<i>Market</i>
April through July--	Kansas City, Louisville, Topeka, Columbus.
April, May, June---	Washington, New Bedford, Omaha.
May, June, July----	Duluth-Superior.
May, June-----	Connecticut, Denver, Sioux City.

April is a fund accumulation month in 7 markets and July in 5.

In all cities, selection of accumulation months appears to have been based on historical milk delivery patterns. Natural divisions in these patterns have been followed closely and only months with the highest volumes of deliveries seasonally have been included in the accumulation periods. Four cities have added a month to their accumulation periods since their original plans became effective apparently because seasonal milk delivery patterns changed slightly. Differences in seasonal patterns of milk deliveries, probably account for most of the differences among markets in accumulation periods.

Fund Accumulation Rates

Premium fund accumulation rates are far from uniform among the 11 markets. The range in the 1952 rates, as shown in the tabulation below, is from 20 cents per hundredweight in Sioux City, Iowa, to 75 cents in Washington, D. C.

Columbus-----	35 cents per hundredweight. ⁸
Connecticut-----	50 cents per hundredweight.
Kansas City, Topeka, & New Bedford.	40 cents per hundredweight.
Sioux City-----	20 cents per hundredweight.
Denver-----	10 cents per pound of butterfat.
Washington, D. C.--	50 and 75 cents per hundredweight.
Louisville-----	12 percent of average of 1951 basic formula prices.
Duluth, Omaha-----	8 percent of spring blend prices.

⁸ This rate is not applicable to Class III uses which include only part of the manufacturing uses in the market and are not a large percentage of total uses of milk.

Rates are set in fixed-dollar amounts per hundredweight of milk in 7 cities. The Denver rate is on a pound-of-butterfat basis. The Louisville rate is 12 percent of the average of the basic formula (manufacturing milk) prices during the preceding calendar year. Duluth-Superior and Omaha rates are 8 percent of the blend price, computed without regard to the fall premium plan, in each of the accumulation months.

In 8 markets, the same fixed-money rate is used throughout the accumulation period. The percentage rates in Duluth and Omaha usually cause rates to differ from month to month in absolute amounts. In Washington, the high 75-cent rate is effective only in May and the 50-cent rate in April and June. Four cities have changed accumulation rates since inception of their plans. In most instances, rate revisions have been upward probably because the general level of milk prices has risen in recent years.

Investment of Premium Funds

Only two markets earn interest through investment of premium funds.⁹ Duluth-Superior invests its funds in short-term U. S. Treasury obligations and New Bedford deposits its funds in a local commercial bank savings account. Interest earnings have been small less than one percent of the sums invested.

Fall Premium Periods

The most common length of the fall premium period is 3 months.

⁹ It is not known whether Columbus and Omaha plan to invest their premium funds. Their plans were initiated only this year (1952).

As the tabulation below indicates, only Louisville has a 4-month period and only Connecticut has a 2-month period. October and November are fall premium months under all plans, while September and December are used in 4 and 7 cities, respectively. In all cases, selection of premium months appears to have been based on historical milk delivery patterns. Natural divisions in these patterns have been followed quite closely and only months with the lowest volumes of milk deliveries have been included in premium periods. Three markets have increased their premium periods by a month since their original plans became effective apparently because seasonal milk delivery patterns change slightly. Differences in seasonal patterns of milk deliveries probably account for most of the differences among markets in premium periods.

Period	Market
September through December.	Louisville.
September, October, November.	Denver, Sioux City, Omaha.
October, November, December.	Washington, New Bedford, Kansas City, Topeka, Duluth, Columbus.
October, November.	Connecticut.

In six markets, numbers of fund accumulation months and premium months are equal. In three markets, premium periods are a month shorter than accumulation periods, and the reverse is true in the remaining two cities. As the tabulation below indicates, the most common practice is to have three accumulation and three premium months.

Accumulation Months	Premium Months	Market
3	3	Duluth-Superior, Washington, New Bedford, Omaha
4	4	Louisville
2	2	Connecticut
4	3	Kansas City, Topeka, Columbus
2	3	Denver, Sioux City

Premium Rates

The most common practice in computing fall premium rates is to divide the premium fund into equal shares, as many shares as there are premium months. The premium rate for a given month then is computed by dividing the amount of one share by the hundredweight of milk delivered by producers during that month. This procedure is used in eight markets. A slightly different, but basically similar, method is used in Denver and New Bedford where producers are paid twice monthly and where pay periods are 15 and 16 days in length. In these markets, premium funds are divided by the number of days in the entire premium period. The amount of the fund distributed in a particular pay period is either 15 or 16 daily shares.

A distinctly different procedure is used in Washington. Here the sum of money accumulated in the premium fund in April is distributed to producers in October. In similar fashion, May is matched with November and June with December.

Premium Distribution Methods

Two distinctly different methods of paying premiums to producers

are in use. Special fall premium checks are sent producers shipping to Kansas City, Louisville, Sioux City, Topeka, and Columbus. Each producer in these markets receives two checks for each premium month. One check covers his share of the milk pool and the other covers his share of the fall premiums paid. Premium checks are plainly marked as such. Also, in these cities, announced blend prices do not include the premiums.

In six markets, no special premium checks are used. The amount of the premium fund allocable to a particular month is simply added to the money to be paid by handlers for milk during this month in computing the blend price. Announced blend prices in premium months in these markets include the premiums and each producer receives only one check each month, as in all other months.

Reliance on Premium Plans

The 11 markets differ greatly in degree of reliance on fall premium plans to vary blend prices seasonally. All markets obtain some seasonal variation in blend prices from variations in class utilization ratios and in Class II prices, and eight cities have seasonally variable Class I prices. Connecticut, Denver, and New Bedford Class I prices do not ordinarily vary seasonally. In Washington, the seasonal variation in Class I prices is not large. Class I and II prices are not directly tied to each other in these markets.

Class I prices in Louisville, Omaha, and Columbus are fixed at a seasonally unchanging differential over basic formula (manufacturing

milk) prices and vary directly with them. Kansas City, Topeka, Sioux City, and Duluth-Superior fix Class I prices in a similar manner except that in these cities Class I differentials are less in spring and summer than in other seasons. The

extent of reliance on fall premium plans for seasonal fluctuations in blend prices is, of course, greatest in markets where Class I prices do not change seasonally. It tends to be least where Class I prices vary seasonally more than Class II prices.

Evaluation of Fall Premium Plans

Fall premium plans may be evaluated in terms of several standards, including (1) necessity, (2) effectiveness, (3) equity, (4) flexibility, and (5) simplicity. Evaluation may also be based on comparison with alternative seasonal pricing plans. Both procedures are used in this study.

Judging the Plan Itself

Necessity

Fall premium plans were developed only 9 years ago (1943) to attack the troublesome problem of large seasonal differences in volumes of farmers' milk deliveries and retail sales of fluid milk products. The need for inducing milk producers to increase fall in relation to spring milk production long has been, and continues to be, great in most markets. Attempts to induce consumers to vary milk consumption rates seasonally through varying retail prices generally have failed. Milk producers' responses to educational programs and promotional campaigns generally have been small and the success of alternative seasonal pricing plans, with few exceptions, has been limited. For these reasons, there was, and still is, ample justification for trying a new approach to an old problem.

Effectiveness

Fall premium plans have increased seasonal variations in blend prices in the eight markets which have had these plans 4 or more years, as shown in table 1. The plans also appear to have induced farmers in these markets to decrease seasonal variations in milk deliveries. Tables 2 and 3 show that ratios of spring to fall milk deliveries to these eight cities have declined since the plans became operative.

The 1949-51 average spring-fall delivery ratios were below corresponding ratios for the 3-year periods immediately prior to adoption of the plans in all eight markets. In some cities, these declines were slight; but in others, notably Washington and Connecticut, decreases were large. Seasonal fluctuations in milk deliveries to Washington in recent years have averaged less than variations in pre-war years; and in Louisville, the 1949-51 and 1935-39 average spring-fall delivery ratios were equal. Furthermore, the plans might have been more effective in other cities had accumulation rates and premiums been larger.

Leaders of producers' associations in all eight cities appear convinced that fall premium plans have

been largely responsible for the improvements in seasonal milk delivery patterns which have taken place in the past few years. Market administrators in the six regulated markets support this conclusion. Such strong support of the plans by competent observers should be given considerable weight in estimating the effectiveness of the plans.

However, there are several reasons for not making an unqualified conclusion on the effectiveness of the plans. They were adopted during or shortly after World War II when spring-fall milk delivery

ratios were abnormally high in most cities. Since the war, fall milk deliveries have increased in relation to spring deliveries to many cities, the majority of which use other types of seasonal pricing plans. How much leveling of delivery patterns was caused by fall premium plans in the eight markets beyond what might have occurred without them cannot be measured. Additional research and study is needed here. This might best be directed toward analysis of farmers' responses to the incentives provided by the plans as evidenced by production records and supplemented

Table 1.—Ratios of spring to fall blend prices, eight markets with fall premium plans, 1935-51

Year	Connecticut ¹	Denver ²	Kansas City ³	Louisville ⁴	New Bedford ⁵	Sioux City ⁶	Topeka ³	Washington ⁵
1935----	0. 90	-----	0. 85	0. 99	0. 99	0. 91	0. 76	0. 94
1936----	. 82	-----	. 76	. 77	. 96	. 68	. 83	. 88
1937----	. 95	-----	. 88	. 87	1. 05	. 89	. 95	. 96
1938----	. 93	-----	. 93	. 95	. 94	. 91	. 98	1. 08
1939----	. 91	-----	. 88	. 83	1. 04	. 80	. 82	. 95
1940----	. 92	-----	. 88	. 83	. 96	. 88	. 98	. 96
1941----	. 91	-----	. 81	. 83	. 90	. 87	. 83	. 87
1942----	. 94	-----	. 82	. 76	. 94	. 88	. 96	. 95
1943----	. 85	0. 91	. 85	. 85	. 86	. 87	. 88	. 89
1944----	. 92	. 92	. 88	⁷ . 83	. 93	. 89	. 93	. 94
1945----	. 89	. 88	. 89	. 80	. 92	. 89	. 93	. 94
1946----	⁷ . 85	. 87	⁷ . 69	. 66	. 83	. 81	. 77	⁷ . 78
1947----	. 76	. 96	. 67	. 67	⁷ . 82	⁷ . 77	. 82	. 78
1948----	. 77	⁷ . 81	. 85	. 87	. 82	. 91	⁷ . 82	. 82
1949----	. 79	. 76	. 71	. 71	. 83	. 82	. 72	. 71
1950----	. 72	. 75	. 71	. 75	. 76	. 80	. 70	. 73
1951----	. 76	. 77	. 72	. 74	. 84	. 88	. 73	. 73

¹ Ratio of May and June to October and November.

² Ratio of May and June to September and October.

³ Ratio of May, June, and July to October, November, and December.

⁴ Ratio of April, May, and June to September, October, and November.

⁵ Ratio of April, May, and June to October, November, and December.

⁶ Ratio of May and June to September, October, and November.

⁷ First year of operation of a fall premium plan.

Sources of basic data: Records of market administrators and producers' associations in the several markets.

Table 2.—*Ratios of spring to fall milk deliveries to eight markets with fall premium plans, 1935-51*¹

Year	Connecticut ¹	Denver ²	Kansas City ³	Louisville ⁴	New Bedford ⁵	Sioux City ⁶	Topeka ³	Washington ⁵
1935----	1.17		1.41	1.25	1.11	1.42	1.46	1.13
1936----	1.14		1.18	1.07	1.06	1.45	1.25	1.08
1937----	1.10		1.36	1.35	1.03	1.55	1.32	1.10
1938----	1.12		1.20	1.25	1.16	1.38	1.20	1.12
1939----	1.09		1.23	1.31	1.01	1.60	1.26	.98
1940----	1.11		1.17	1.30	1.06	1.43	1.16	.97
1941----	1.04		.92	1.30	1.02	1.54	1.25	1.03
1942----	1.14		1.39	1.33	1.05	1.51	1.35	1.19
1943----	1.34	1.38	1.26	1.38	1.25	1.64	1.33	1.24
1944----	1.25	1.39	1.29	⁷ 1.19	1.27	1.56	1.18	1.19
1945----	1.32	1.41	1.41	1.42	1.29	1.58	1.37	1.34
1946----	⁷ 1.26	1.35	⁷ 1.24	1.33	1.21	1.43	1.16	⁷ 1.14
1947----	1.27	1.46	1.52	1.34	⁷ 1.29	⁷ 1.58	1.59	1.21
1948----	1.24	⁷ 1.29	1.27	1.26	1.23	1.54	⁷ 1.34	1.16
1949----	1.12	1.27	1.24	1.30	1.20	1.56	1.28	1.08
1950----	1.14	1.31	1.26	1.20	1.19	1.49	1.36	1.04
1951----	1.20	1.35	1.41	1.24	1.17	1.34	1.35	1.09

¹ Ratio of May and June to October and November.

² Ratio of May and June to September and October.

³ Ratio of May, June, and July to October, November, and December.

⁴ Ratio of April, May, and June to September, October, and November.

⁵ Ratio of April, May, and June to October, November, and December.

⁶ Ratio of May and June to September, October, and November.

⁷ First year of operation of a fall premium plan.

Sources of basic data: Records of market administrators and producers' associations in the several markets

by personal interviews. It is recognized, however, that even this analysis might prove inconclusive.

Other factors also complicate measurement. One is the weather which in some years was more favorable to spring milk production than in other years. Numbers of producers and milk quality requirements changed in some markets. Both of these factors, by altering proportions of milk producers of various types, may have affected average seasonality patterns. Finally, important differences among milksheds in farming and marketing conditions make inter-market com-

parisons a somewhat questionable basis for conclusions on the effectiveness of the plans.

In short, even though the effectiveness of fall premium plans can not be measured with accuracy, the plans may be a potent means of inducing farmers to reduce seasonal fluctuations in milk production. Furthermore, with only slight modifications, the plans probably can be more effective than they have been.

Equity

Fall premium plans treat all milk producers equitably. They operate strictly in accordance with the

principle of uniform prices to producers, a principle which long has been recognized as just.

The plans also provide for unequal rewards for unequal performance. Milk in the fall is more valuable than milk in the spring. Fall premium plans assure producers of higher fall than spring blend prices.

Fall premium plans are also fair to milk producers in that they do not in any manner restrict a producer's freedom to manage his dairy enterprise. The plans merely provide incentives, both positive and negative, to which each producer is free to respond, or to ignore, as he sees fit.

Flexibility

Business plans usually are at least partially flexible; that is, they have some inherent capacity to adjust to changes in business condi-

tions. In a dynamic economy, this flexibility is necessary, since inflexibility can be costly, or on occasion, even disastrous.

An important element of flexibility in fall premium plans is the automatic adjustment of premium rates to changes in the seasonal pattern of milk deliveries. When fall milk deliveries increase in relation to spring deliveries, fall premiums automatically decrease. The milk pooling mechanism also causes fall blend prices to decline in relation to spring blend prices. The two mechanisms acting together decrease incentives for fall milk production and may arrest the trend toward greater fall milk production. On the other hand, if spring production increases in relation to fall production, both fall premiums and fall blend prices automatically increase. This increases price incen-

Table 3.—Ratios of spring to fall milk deliveries, for selected periods, eight markets with fall premium plans ¹

Market	1949-51	Three years before plan initiated		1935-39
		Years	Ratio	
Connecticut ¹ -----	1. 15	1943-45	1. 30	1. 12
Denver ² -----	1. 31	1945-47	1. 41	(⁷)
Kansas City ³ -----	1. 30	1943-45	1. 32	1. 28
Louisville ⁴ -----	1. 25	1941-43	1. 34	1. 25
New Bedford ⁵ -----	1. 19	1944-46	1. 26	1. 07
Sioux City ⁶ -----	1. 46	1944-46	1. 52	1. 40
Topeka ³ -----	1. 33	1945-47	1. 37	1. 30
Washington ⁵ -----	1. 07	1943-45	1. 26	1. 08

¹ Ratio of May and June to October and November.

² Ratio of May and June to September and October.

³ Ratio of May, June and July to October, November, and December.

⁴ Ratio of April, May, and June to September, October, and November.

⁵ Ratio of April, May, and June to October, November, and December.

⁶ Ratio of May and June to September, October, and November.

⁷ Not available.

Sources of basic data: Records of market administrators and producers' associations in the several markets.

tives for fall milk production and tends to arrest the trend toward higher spring-fall production ratios.

When fund accumulation rates are fixed as a percentage of spring blend or basic formula prices as in Duluth, Omaha, and Louisville, additional flexibility is built into a fall premium plan. When blend or formula prices rise or fall a percentage rate causes accumulation and premium rates to rise and fall in fixed-dollar amounts also. The over-all result is to increase the stability of ratios of fall to spring blend prices. That is, a percentage accumulation rate tends to hold this ratio within relatively narrow limits even though formula and class prices fluctuate widely. This is a feature, for reasons explained in a later section of this report, which may be important to the effectiveness of fall premium plans.

Simplicity

Fall premium plans are simple. No more than a few short sentences may be required in a Federal milk marketing order to set forth the whole plan in detail. One advantage of this simplicity is the ease with which the plans can be explained to and understood by farmers, most of whom find milk pricing plans quite baffling. Although complexity has not been an insurmountable barrier to enlisting farmers' support of pricing plans, it can hardly have made this task easier. The simplicity of fall premium plans may have contributed to their acceptance and support by farmers, and, therefore, to their effectiveness.

The simplicity of the plans also affects costs of administration. Ad-



Class II milk prices do not vary much seasonally since they are based on prices of manufactured dairy products or prices paid for milk at the manufacturing plants.

ditional administrative costs created by the plans are negligible even for plans providing for special premium checks to milk producers. In fact, the small amount of interest income obtainable by investment of fall premium funds usually can more than offset any additional administrative costs attributable to the plans.

Comparison With Seasonal Class Price Plans

Most city milk markets use seasonal class price plans to provide incentives to farmers to increase fall in relation to spring milk production. The relative merits of fall premium and seasonal class price plans are outlined in this section. Base-surplus and fall premium plans are compared in the next section.

Seasonal Class Price Plans Described

Under a seasonal class price plan,

class I and II prices vary widely seasonally, in accordance with Government orders or producer-handler contracts governing the market. Variations in Class I prices, however, cause most of the variations in blend prices for two reasons: (1) Class I uses constitute the major portion of total milk uses in most markets, and (2) Class II milk prices vary seasonally within relatively narrow limits because they are based on prices of manufactured dairy products or on prices paid for milk at manufacturing plants.

In Midwestern cities where Class

I prices are fixed at prescribed differentials over Class II, or basic formula prices, these differentials vary seasonally, or even monthly. For example, Indianapolis Class I prices ranged from \$1.00 to \$1.85 per hundredweight over butter-powder formula prices in 1951. Boston Class I prices are the Class I formula prices in the first and third calendar quarters; in the second quarter, they are the formula prices minus 44 cents; and in the fourth quarter, they are 44 cents above the formula prices. These changes in Class I prices combined with sea-

Table 4.—Comparison of a milk pool under a fall premium plan and a seasonal class price plan, Duluth-Superior, May 1951

A. Pool under fall premium plan

Item	Pounds of Milk	Pounds of Butterfat	Price	Value
Class I	5, 358, 538	187, 548. 83	\$4. 362	\$233, 739. 43
Add: Butterfat over 3.5 %		37, 327. 75	. 830	30, 982. 03
Class II	6, 497, 027	227, 395. 95	3. 362	218, 430. 04
Add: Butterfat over 3.5 %		18, 395. 11	. 830	15, 267. 94
Total	11, 855, 565	470, 667. 64		498, 419. 44
Subtract: Various adjustments				47, 540. 23
Subtract: Fall premium fund accumulation				36, 510. 02
Uniform price and value			3. 51	414, 369. 19

B. Pool under seasonal class price plan

Class I	5, 358, 538	187, 548. 83	\$3. 681	\$197, 229. 41
Add: Butterfat over 3.5 %		37, 327. 75	. 830	30, 982. 03
Class II	6, 497, 027	227, 395. 95	3. 362	218, 430. 04
Add: Butterfat over 3.5 %		18, 395. 11	. 830	15, 267. 94
Total	11, 855, 565	470, 667. 64		461, 909. 42
Subtract: Various adjustments				47, 540. 23
Uniform price and value			3. 51	414, 369. 19

Source of basic data: Market Administrator, Duluth-Superior Milk Marketing Area.

sonal changes in Class II prices and in proportions of milk used in the two classes may cause blend prices to vary greatly during the year.

Price Incentives About Equal

Blend prices under a fall premium plan can be identical with blend prices under a seasonal class price plan. It is also possible for blend prices under one plan to be either higher or lower than blend prices under the other plan.

Table 4 presents computations of the May 1951 milk pool for the Duluth-Superior market under its fall premium plan and under an alternative seasonal class price plan which would have provided a blend price equal to the one announced.

In these computations, the principal differences are the lower Class I price and the reduced value of Class I milk under the seasonal class price plan. This reduction of 68.1 cents per hundredweight of milk in Class I equals the addition to the reserve fund under the fall premium plan. Obviously, in table 4, if the Class I price were less than \$3.681, the blend price under the seasonal class price plan would be less than \$3.51, and conversely.

The accuracy achieved in table 4 in making blend prices under the two plans equal could not be realized in practice. Pricing plans are established to govern future, and not past, periods; and the future cannot be predicted exactly. For these reasons blend prices under the two plans even though they are designed to produce approximately equal results are not likely to be identical. Differences between

them, however, may as likely be in one direction as in the other.¹⁰

From the foregoing, it is apparent that neither type of plan is superior to the other in the extent to which it rewards producers of fall milk and penalizes producers of spring milk. The provisions of particular plans, not the general type of plan, determine incentives for reducing seasonal production variations.

Forward Pricing Effects Similar

One of the merits of fall premium plans is their advance notice to farmers of approximate differences between future fall and spring blend prices. Farmers are assured that these differences will average substantially more than double the announced accumulation rate, except when unusual changes in general levels of milk prices occur, as in 1948. Such advance notice of future price relationships may be a factor of some importance in inducing farmers to plan essential changes in dairy enterprises and in seasonal milk production patterns.

Seasonal class price plans have a similar but less obvious forward pricing feature in the form of announced schedules of changes in Class I prices or Class I price differentials over basic formula prices.

¹⁰ These conclusions may seem, at first glance, to be contrary to those reached by Roberts, J. B., *The Louisville Fall-Premium Plan for Seasonal Milk Pricing*, 75 pp., Ky. Agr. Expt. Sta. Bul. 510, pp. 51-7, Lexington, 1947. This is not true since Roberts' alternative plans, "straight pooling" and "seasonal differential," are not the same as a seasonal class price plan. Roberts is correct in concluding that a fall premium plan *when added to a seasonal class price plan* will always increase seasonal blend price variations. The comparison in table 4, however, is one plan against the other, quite a different basis of analysis.

Retail Price Stability Important

Although fall premium and seasonal class price plans may differ only slightly in their effects on milk producers, the two plans affect milk distributors and consumers in substantially different ways. Large seasonal variations in Class I prices are essential under seasonal class price plans but can be avoided under fall premium plans.

For example, table 5 shows that Duluth-Superior blend prices varied \$1.74 from \$3.51 to \$5.25 per hundredweight in 1951, while Class I prices varied only 49 cents from \$4.36 to \$4.85. To have achieved the range of \$1.74 in blend prices with a seasonal class price plan would have required Class I prices to fluctuate a maximum of \$1.92,

from \$3.68 in May to \$5.60 in December 1951. The approximate retail price equivalents of these ranges in Class I prices are only one cent per quart under the fall premium plan compared with 4 cents per quart under the seasonal class price plan. The Duluth market is by no means unusual in this respect. Class I and retail prices would have had to vary as much or more in several other markets in 1951 to have provided blend price variations as large as those under fall premium plans.

The relative merits of stable versus seasonally fluctuating Class I and retail milk prices constitute the basic issue in a choice between fall premium and seasonal class price plans. Economic theory sup-

Table 5.—Actual blend and class prices and Class I prices under an alternative seasonal class price plan, Duluth-Superior, 1951¹
[Dollars per cwt.]

Month	Blend price	Class I prices		Class II price
		Actual	Alternate plan	
January	\$4. 19	\$4. 479	No change	\$3. 249
February	4. 32	4. 693	do	3. 463
March	4. 20	4. 681	do	3. 451
April	3. 99	4. 598	do	3. 368
May	3. 51	4. 362	\$3. 681	3. 362
June	3. 62	4. 538	\$3. 730	3. 538
July	3. 67	4. 546	\$3. 828	3. 546
August	4. 04	4. 486	No change	3. 486
September	4. 21	4. 596	do	3. 446
October	4. 98	4. 612	\$5. 311	3. 462
November	5. 25	4. 757	\$5. 476	3. 607
December	5. 15	4. 854	\$5. 595	3. 704
Range	1. 74	0. 492	\$1. 914	0. 342

¹ Prices under the seasonal class price plan were computed so that with actual Class I and II uses and actual Class II prices the pool would produce the same blend prices actually announced.

Source of basic data: Market Administrator, Duluth-Superior Milk Marketing Area.

ports seasonal variations in Class I and retail prices. In theory, prices perform at least two essential economic functions:

1. Prices stimulate producers to supply the goods consumers want in the quantities, forms, places, and times consumers want them. Normally, the higher the prices are, the greater the stimuli to produce, and conversely.

2. Prices also ration available supplies of goods and services among consumers. Normally, the higher the prices are, the fewer people there are who buy and the less the average consumer purchases, and conversely. Thus, prices act as "double-edged swords" stimulating consumption and discouraging production with low prices at times, and doing the opposite with high prices at other times.

A strong argument against fall premium plans is that they destroy "one edge of the pricing sword." They permit the pricing system to influence only the supply side of a milk market. Seasonal class price plans, on the other hand, affect both sides of a market and, therefore, may be more efficient.

The case for seasonally stable Class I and retail milk prices has two major points: (1) The demand for milk is so inelastic over short periods of time that little seasonal pricing efficiency is lost by holding retail prices seasonally constant, that is, one "edge of the price sword" under seasonal class price plans is too dull to have the effects claimed for it; and (2) seasonally fluctuating consumer prices are disturbing factors in milk markets tending to reduce sales of milk.

Economists generally view the demand for milk as relatively inelastic. This view has the support of several studies.¹¹ In a period no longer than a few months the demand for milk probably is highly inelastic. That is, even a large decrease (increase) in retail milk prices will induce consumers to purchase very little more (less) milk. Therefore, seasonally varying retail milk prices—within probable ranges—are not likely to affect seasonal milk consumption patterns appreciably.

Milk distributors often claim that they sell more milk when retail prices are stable than when they change frequently. They offer several reasons for this belief:

1. Changes in milk prices frequently receive undue public attention. Milk is a large part of the average family's food budget; milk is delivered regularly to consumers' homes. Milk bills are paid separately from bills for other foods. Consumers in many cities are accustomed to seasonally stable milk prices. And milk prices often are used by the public as symbols of changes in general living costs.

2. Many consumers believe that milk distributors are monopolists and various groups occasionally attempt to take advantage of this feeling at the expense of the milk industry.

3. Few consumers have sufficient knowledge of production and distribution economics to understand

¹¹ Blanford, C. J. *The Demand for Milk and Cream as Revealed by Consumer Purchases at Retail Stores in New York City*. 96 pp. Cornell Agr. Expt. Sta. Bul. 765, Ithaca (New York), 1938; and Gaumnity, E. W., and Reed, O. M. *Some Problems in Establishing Fluid Milk Prices*. 227 pp. U. S. Agr. Adjust. Admin. Washington, 1937.

causes of price changes. Few consumers know why farm prices of milk must vary seasonally. Few understand that uniform retail prices may be as indicative of intense competition as of monopoly.

4. As a result, frequent retail price changes keep milk distributors on the defensive attempting to justify their prices. This is especially true when a regular seasonal price rise occurs when other food prices and consumer incomes are stable or declining.

5. The way to sell milk, some distributors argue, is to sell milk products on their non-price attributes.

Distributors encounter another kind of problem when they attempt to hold retail prices seasonally constant despite fluctuating Class I prices. They may absorb large losses each fall and try to recoup them each spring. Distributors often claim that while the losses are certain their recovery is far from a sure thing.

The pressure to reduce unit processing and distribution costs through increasing sales volumes is strong in the milk business. Generally speaking, individual distributors can increase sales volumes materially only by taking customers away from other distributors. Price cutting, either open or secret, is a powerful means for increasing sales provided that other distributors do not follow suit, something they usually are forced to do in self-defense. Yet, in spite of the infrequent success of price cutting, the temptation remains and recovery of losses in one season through extra profits in another is

uncertain. Furthermore, price "wars," either open or secret, are decidedly disruptive to orderly marketing processes and to efficiency in milk distribution.

Leaders of producers' bargaining associations also argue that stable Class I and retail milk prices simplify and improve their bargaining positions. Many associations aim to get for their members, on the average, a certain percentage of consumers' expenditures for milk. When retail and Class I prices fluctuate, distributors' margins also change, and an average margin is not easily estimated.

Furthermore, distributors in setting retail prices often follow Class I prices downward but anticipate upward movements in Class I prices. This tends to increase their margins. Stable Class I and retail prices, therefore, some producers argue, give them a better chance to increase their share of consumers' expenditures for milk.

What conclusions can be drawn from the arguments above? There is much merit to both affirmative and negative views. Facts and logic, however, seem to favor seasonally stable retail milk prices. Although it would be unreasonable to deny the general validity of arguments for flexible retail prices, fluid milk seems to be a special case. Consumer demand for milk is so inelastic that seasonal retail price changes—within probable ranges—have little effect on the seasonality of consumption. The disadvantages, on the other hand, of seasonal retail and Class I price changes in reducing orderliness and efficiency in marketing appear great.

Comparison with Base-Surplus Plans

Both base-surplus and fall premium plans affect distribution of money paid by handlers to milk producers. Neither plan necessarily affects handlers' buying or selling prices. And both types of plans are imposed on use-classification and pooling mechanisms.

Base-Surplus Plans Described

Under base-surplus plans each milk producer receives two blend prices each delivery period. These are known as base and surplus, or excess, prices. The base price is the higher of the two because it is a blend of the prices paid by handlers for only the highest-valued uses of milk. The surplus price is a blend of the prices paid for the lower-valued uses of milk.

Each producer normally receives the base price for all milk delivered to handlers up to his base quantity. He receives the lower surplus price for deliveries in excess of his base. This base in any delivery period commonly equals the number of days in the period multiplied by his average daily milk deliveries during some previous base-forming period. This period usually consists of several fall and winter months.¹²

Seasonal price incentives to milk

¹² Differences in provisions among base-surplus plans are great. The attempt made here is to describe the plans as a class. For additional information on these plans see:

Weldon, W. C., and Herrmann, L. F., *Base Allotment or Quota Plans Used by Farmers' Cooperative Milk Associations*, 41 pp. Misc. Rep. 23, U. S. Farm Credit Admin., Washington 1940; and

Quackenbush, G. G., and Homme, H. A., *Seasonal Price Incentives of the Base and Excess Plan in the Detroit Milk Market*, 41 pp. Mich. Agr. Exp. Sta. Tech. Bul. 228, East Lansing 1952.

producers under base plans are created by two factors:

1. Each producer's seasonal production pattern affects his base, quantities of milk sold each delivery period at base and surplus prices, and, consequently, his gross returns. A spring producer, because his fall milk deliveries are small relative to his annual deliveries, has a small base and receives surplus prices on a large percentage of his annual production. Seasonally-even and fall producers, in contrast, receive the higher base prices on most of the milk they produce.

2. Since base and surplus prices are blend prices, they vary seasonally as the result of seasonal changes, if any, in use-class prices and in percentages of milk used in these classes.

Incentives Differ

Although direct comparisons of prices to producers under fall premium and base-surplus plans would be misleading, differences in incentives can be estimated by comparing annual returns to producers under the two plans. Although data for a particular milk market might have been used for this comparative analysis, the hypothetical data of table 6 were used to simplify computations. No loss of essential information or errors in analysis may be attributed to these simplifications.

Table 6 presents two hypothetical milk pools for a market, three sets of class prices, and milk delivery patterns for four distinctly different types of milk producers.

Table 7 presents the annual average prices received by these

four types of producers computed from the data of table 6 under a base plan and four premium plans alike except for accumulation and premium rates. Some of the important findings (table 7) and

conclusions from this analysis are:

1. An average producer's returns are not affected by the type of seasonal pricing plan employed so long as the plan does not change the total sum of money paid by

Table 6.—Hypothetical milk pool and price data used to estimate price incentives of seasonal pricing plans

Pool No. 1				Pool No. 2			
Quarter	Daily milk receipts	Uses		Quarter	Daily milk receipts	Uses	
		Class I	Class II			Class I	Class II
1-----	100	80	20	1-----	100	60	40
2-----	110	80	30	2-----	110	60	50
3-----	102	80	22	3-----	102	60	42
4-----	88	80	8	4-----	88	60	28
Average--	100	80	20	Average--	100	60	40

Prices A			Prices B		Prices C	
Quarter	Class I	Class II	Class I	Class II	Class I	Class II
1-----	\$5. 10	\$4. 10	\$5. 50	\$4. 10	\$3. 83	\$3. 08
2-----	4. 80	3. 80	5. 20	3. 80	3. 60	2. 85
3-----	4. 90	3. 90	5. 30	3. 90	3. 67	2. 92
4-----	5. 20	4. 20	5. 60	4. 20	3. 90	3. 15
Average-----	5. 00	4. 00	5. 40	4. 00	3. 75	3. 00

Average daily deliveries by type of producer

Quarter	Average producer	Spring producer	Even producer	Fall producer
1-----	100	90	100	105
2-----	110	140	100	90
3-----	102	110	100	95
4-----	88	60	100	110
Average-----	100	100	100	100

Table 7.—Estimated annual average gross returns of producers by type of seasonal pricing plan and by seasonal pattern of milk deliveries based on data of table 6

I. Pool No. 1, Prices A

	Type of producer				Percent fall exceeds	
	Average	Spring	Even	Fall	Spring	Even
<i>Plan:</i>						
Base-surplus ¹	\$4. 7885	\$4. 5905	\$4. 8528	\$4. 8661	6. 0	0. 3
Premium, 20 cents ²	4. 7885	4. 7091	4. 8177	4. 8462	2. 9	. 6
Premium, 40 cents ³	4. 7885	4. 6766	4. 8302	4. 8699	4. 1	. 8
Premium, 12% basic ³	4. 7885	4. 6636	4. 8352	4. 8794	4. 6	. 9
Premium, 10% blend ³	4. 7885	4. 6680	4. 8335	4. 8762	4. 5	. 9

II. Pool No. 2, Prices A

<i>Plan:</i>						
Base-surplus	\$4. 5885	\$4. 4316	\$4. 6396	\$4. 6527	5. 0	0. 3
Premium, 20 cents	4. 5885	4. 5124	4. 6163	4. 6437	2. 9	. 6
Premium, 40 cents	4. 5885	4. 4799	4. 6288	4. 6674	4. 2	. 8
Premium, 12% basic	4. 5885	4. 4669	4. 6338	4. 6769	4. 7	. 9
Premium, 10% basic	4. 5885	4. 4743	4. 6310	4. 6715	4. 4	. 9

III. Pool No. 2, Prices B

<i>Plan:</i>						
Base-surplus	\$4. 8985	\$4. 6700	\$4. 9750	\$4. 9963	7. 0	0. 4
Premium, 20 cents	4. 8985	4. 7961	4. 9375	4. 9741	3. 7	. 7
Premium, 40 cents	4. 8985	4. 7636	4. 9500	4. 9979	4. 9	1. 0
Premium, 12% basic	4. 8985	4. 7534	4. 9550	5. 0074	5. 3	1. 0
Premium, 10% blend	4. 8985	4. 7545	4. 9535	5. 0046	5. 3	1. 0

IV. Pool No. 2, Prices C

<i>Plan:</i>						
Base-surplus	\$3. 4789	\$3. 3490	\$3. 5223	\$3. 5365	5. 6	0. 4
Premium, 20 cents	3. 4789	3. 4015	3. 5080	3. 5357	3. 9	. 8
Premium, 40 cents	3. 4789	3. 3690	3. 5205	3. 5595	5. 7	1. 1
Premium, 12% basic	3. 4789	3. 3755	3. 5180	3. 5547	5. 3	1. 0
Premium, 10% blend	3. 4789	3. 3811	3. 5159	3. 5507	5. 0	1. 0

¹ Base-forming period assumed to be the 6 months of October through March with base and surplus prices applicable only in the 6 months April through September.

² Accumulation rate assumed to be 20 cents per hundredweight in the second quarter with premiums paid in the fourth quarter.

³ Same as footnote ² except accumulation rates of 40 cents, 12 percent of the annual Class II price, and 10 percent of average second quarter blend prices, respectively.

handlers to producers. One assumption underlying the findings of table 7 is equality of total payments by all handlers to producers under the several plans for any given combination of a pool and class prices. Since an average producer is one whose delivery pattern is identical with the market pattern except, of course, in volume, he receives a constant percentage of amounts paid by handlers for milk irrespective of the seasonal pricing plan used in the market. In other words, the only way a producer's annual average price can differ from the average for the market is for his delivery pattern to differ from the market pattern. This is true under all seasonal pricing plans.

2. Base-surplus plans definitely favor even producers over fall producers when compared with fall premium plans. There is little financial incentive for a farmer to adopt a fall milk production program under a base plan. This is because gross returns are nearly as high with a seasonally even production pattern which can be expected to be somewhat less costly to achieve.¹³ Table 7 shows that while a fall producer receives only 0.3 or 0.4 percent more than an even producer under the base plan, the premium plan with an accumulation rate of 10 percent of spring blend prices grosses him 0.9 or 1.0 percent more annually. This is an advantage for a fall premium plan.

3. On the other hand, base plans tend to penalize spring producers more than do fall premium plans. As table 7 shows, average annual prices received by spring producers are lower with the base plan than with any of the four fall premium plans, under all of the assumed pricing and pooling conditions. This is an advantage for base-surplus plans.

4. Finally, neither base-surplus nor fall premium plans consistently provide higher incentives for even or fall production than the other. This is also shown in table 7. A clearer demonstration of this could be made if a larger number of variations of the two types of plans had been compared. The basic point here is that how a particular plan is constructed, whether it is a base or a premium plan, is more important than the type of plan in determining incentives to milk producers to reduce seasonal variations in milk deliveries to cities.

Relative Effectiveness May be Equal

From the foregoing, no definite conclusions can be made on the relative effectiveness of base-surplus and fall premium plans in reducing seasonal variations in milk production. Data of markets using these plans support this statement.

For example, Detroit which has one of the oldest and most successful base-surplus plans now in use, received, in recent years, about 30 percent more milk from local producers in the spring than in the fall.¹⁴ As table 3 shows, seven of the eight

¹³ Quackenbush, G. G., and Homme, H. A., *Seasonal Price Incentives of the Base and Excess Plan in the Detroit Milk Market*, 41 pp. Mich. Agr. Exp. Sta. Tech. Bul. 228, East Lansing, 1952, on p. 13, concur on this point.

¹⁴ Quackenbush, G. G., and Homme, H. A., *Seasonal Price Incentives of the Base and Excess Plan in the Detroit Milk Market*, 41 pp., Mich. Agr. Exp. Sta. Tech. Bul. 228, East Lansing, p. 5, 1952.

markets which have had fall premium plans 4 or more years have about equally low or lower ratios of spring to fall milk deliveries. Also, in recent years, five of the eight have had spring-fall delivery ratios nearly as low or lower than their prewar ratios when most of these markets had base-surplus plans. The Washington market, in particular, which had a base plan for many years prior to World War II, had a slightly lower spring-fall delivery ratio in 1949-51 than in 1935-39 (table 3). Connecticut has had almost equal success with its fall premium plan relative to its prewar experience with its base-surplus plan. For these reasons, conclusions on the desirability of base-surplus plans and fall premium plans must be based on other grounds. On some of these other bases fall premium plans are clearly superior.

Fall Premium Plans More Flexible

Under a base-surplus plan maximum incentives for seasonally even milk production are achieved when base and Class I prices are equal and when surplus and Class II prices are equal.¹⁵ This can happen only when Class I and base quantities are equal. This situation, in turn, is unlikely unless bases are arbitrarily adjusted frequently to equal Class I uses. Producers generally resist these arbitrary adjustments. Without them, however, any change in Class I relative to

total uses alters both the general level of prices to producers and relationships of base to surplus prices.

Changes in Classes I and II price relationships also change base in relation to surplus prices. These changes alter relative returns to producers with different seasonal milk production patterns. The instability of these relative returns under a base-surplus plan when price and use ratios change is evident in table 7. When surplus prices approach base prices, seasonal price incentives are reduced, and conversely. During World War II, many base-surplus plans became relatively ineffective for this reason and many were abandoned.¹⁶ Such changes in seasonal price incentives are less likely under fall premium plans, as table 7 indicates, particularly when accumulation rates are of the percentage type. Such a rate holds ratios of fall to spring blend prices within relatively narrow limits in spite of wide fluctuations in class prices and milk utilization patterns. This advantage of fall premium plans is discussed in greater detail in another section below.

Base-Surplus Plans More Complex and Restrictive

Fall premium plans are much simpler than base plans. They are, therefore, probably easier to understand and to administer. Even record-keeping under a base plan requires much more labor and expense. Base plans also create other troublesome administrative

¹⁵ For an excellent exposition of the several factors influencing price and income incentives provided by base-surplus plans see: Quackenbush, G. G., and Homme, H. A., *Seasonal Price Incentives of the Base and Excess Plan in Detroit Milk Market*, 41 pp., Mich. Agr. Exp. Sta. Tech. Bul. 228, East Lansing, pp. 15-30, 1952.

¹⁶ For an account of the Detroit experience during World War II see: Quackenbush and Homme, *Seasonal Price Incentives of the Base and Excess Plan in the Detroit Milk Market*, pp. 26-8 referred to in footnote 15.

problems which have led to their abandonment in some markets. Among these, perhaps the most difficult is adjustment of individual producers' bases in hardship cases.¹⁷

Base-surplus plans also have been criticized as disguised means of creating artificial monopolies. Base plans can be and have been constructed so as to erect barriers to free entry of producers to a market. Such barriers foster injustices and economic inefficiency. Some plans also discourage producers from ex-

panding herds, thereby benefiting established producers at the expense of young farmers trying to expand their enterprises. As a consequence, in part, of these criticisms of prewar base plans, most markets adopting base plans since World War II now use sharply revised versions of the prewar plans. These postwar plans, however, are not completely free of undesirable restrictive features. In contrast, fall premium plans cannot be justly criticized on any of the above points; complexity, restrictiveness, or administrative difficulty.

Designing Fall Premium Plans

How effectively a fall premium plan achieves its objectives will depend, in large measure, on its design and administration. Although fall premium plans are simple in structure, some of the most difficult problems in pricing agricultural commodities are involved in their design. At least three of these must be resolved before consideration can be given to particular features of a plan.

Basic Preliminary Problems

The three basic preliminary problems are: (1) The seasonal pattern of milk deliveries suitable for the market; (2) the pattern of prices necessary to induce milk producers, as a group, to meet this seasonal delivery goal; and (3) the extent of reliance upon the fall premium plan to secure the required seasonal

variations in prices to milk producers.

A fall premium plan is only one part of the whole complex structure of milk pricing in city markets. The design of a plan, therefore, should always be made in terms of the complete milk pricing structure.

Decisions on these basic problems cannot be avoided. Every decision on every provision of a fall premium plan is actually based on conclusions, no matter how vaguely held, on these basic problems.

For this reason, the need for their thorough study cannot be over-emphasized. Careful study of past experiences in the market in seasonal pricing and marketing of milk can be of great help in reaching satisfactory conclusions on these problems. Study of plans and their operation in other markets may also be helpful. It is not, however, correct to assume that a particular plan will operate successfully in one market simply because it seems to be working well in another. Finally,

¹⁷ In this connection see: Weldon, W. C., and Hermann, L. F., *Base Allotment or Quota Plans Used by Farmers' Cooperative Milk Associations*, 41 pp. Misc. Rep. 23, U. S. Farm Credit Admin., Washington, 1940.



One of the problems involved in a successful fall premium plan is to set up a pattern of prices that will induce milk producers, as a group, to meet this seasonal milk delivery goal with their herds.

because of the difficulty of these basic pricing problems, leaders of milk producers' cooperatives probably will find it desirable to enlist the aid of milk marketing specialists in studying them.

Provisions

After reasonably satisfactory conclusions have been reached on the major preliminary problems, selection of particular provisions of a fall premium plan may be made. The major provisions involve: (1) accumulation months, (2) accumulation rates, (3) premium months, (4) premium rates, (5) methods of paying premiums, and (6) investment of premium funds in the interval between accumulation and disbursement.

Accumulation Months

Selection of months in which fall premium funds are accumulated is basically a question of when blend prices should be reduced each year. In the absence of administered prices, competitive forces ordinarily would cause prices to decline in months when milk production is

seasonally largest. Existing fall premium plans provide for accumulation periods of 2, 3, and 4 months' duration. In all cases, May and June are designated. Several plans designate April and others July as the third accumulation month, and still others use the entire period April through July.

Selection of accumulation months for any given market should be based on careful study of the prevailing milk delivery pattern and should be consistent with the seasonal pricing pattern sought for the market.

Two other considerations are also involved in selecting accumulation months. These are (1) degree of continuity of seasonal price changes and (2) length of the premium period. Both are important because they affect the seasonal pattern of blend prices. The first one is discussed below in connection with accumulation rates.

The length of the premium period has a bearing on the length of the accumulation period. With the accumulation rate and the length of

the premium period fixed, a 2-month accumulation period will provide much less premium money than a 3- or 4-month period. One of the reasons advanced by marketing leaders in those cities having longer accumulation than premium periods for this arrangement is to effect higher premiums and a greater seasonal range in blend prices. In other words, the relative lengths of the two periods, as well as accumulation rates, will affect the seasonal range of blend prices.

Accumulation Rate

One of the most important provisions of a fall premium plan establishes the premium fund accumulation rate. This rate largely determines the decline in spring blend prices. Together with spring milk deliveries, it fixes the amount of the premiums which can be paid the following fall. This amount, in turn, divided by fall milk deliveries fixes the average premium rate which usually constitutes most of the increase in fall blend prices.

The two key issues involved in fixing an accumulation rate are its amount and the method of establishing it. The amount of the rate depends on (1) the amount fall blend prices should exceed spring blend prices and (2) the proportion of this difference which should be provided by the fall premium plan.

If the designer of a fall premium plan has determined the seasonal pattern of blend prices suitable for his market, as previously suggested, he has, in effect, determined the amount by which fall blend prices should exceed spring blend prices. It is, however, important to the

subsequent effectiveness of the plan whether he conceives of this as a fixed-dollar difference or a percentage difference.

A fixed-dollar difference between spring and fall blend prices changes in relative size with every change in their general level. For example, a difference of \$1 when spring blend prices average \$2 makes fall prices 50 percent higher. Fall prices, however, are only 25 percent higher when spring prices advance to \$4.

Such changes in price relationships seriously alter the real value of seasonal price incentives to producers because seasonal production cost relationships appear to fluctuate little as general levels of costs rise and fall. That is, if production costs are \$2 in the spring and \$3 in the fall, there is more likelihood that this seasonal difference will rise to \$1.50 as spring costs advance to \$3 than to remain at \$1. Although relationships among prices of items entering into costs of milk production are by no means static, they seldom fluctuate greatly. The principle reason for this relative stability is the strong tendency for farm prices to rise and fall together.

Farmers appear to respond, although imperfectly, to changes in seasonal price ratios even though most farmers conceive of price differences in fixed rather than percentage terms. Apparently, as general levels of prices rise and fall, farmers' estimates of money values of adequate seasonal price incentives also change in the same direction and roughly in the same proportions.

For these reasons, fall premium plans which hold spring-fall price

relationships at some nearly constant ratio (percentage) will have greater probabilities of successful operation because they will more frequently provide price incentives in line with seasonal production costs.

The second basic issue involved in fixing the amount of an accumulation rate is how much of the total seasonal variation in blend prices ought to be obtained from each of the three main sources: (1) the fall premium plan, (2) seasonal variations in class prices, and (3) the pooling mechanism.

Seasonal variation in blend prices caused by the pooling mechanism ordinarily are not large and are not easily altered. They are dependent largely on seasonal fluctuations in the ratio of Class I to total milk uses. Ordinarily, the greater the seasonal variation in milk deliveries from producers the more the percentage and blend prices vary.

Class II prices, since they usually are based on prices of manufactured dairy products, ordinarily vary only slightly seasonally. Also, Class II uses are a small portion of total milk uses in most markets. As a result, the major causes of seasonal changes in blend prices are seasonal variations in Class I prices and fall premium plans.

Among markets with these plans, the amount of seasonal variation permitted in Class I prices is far from uniform. This again raises the issue of the proper degree of seasonal stability in Class I and retail prices previously discussed in this report. If highly stable Class I and retail milk prices are wanted, a much higher accumulation rate will

be necessary than if less stable prices to distributors and consumers are preferred.

In selecting a method of fixing the accumulation rate, the choice appears to be between a direct procedure and a percentage basis. Under the direct method, a rate is simply set at some fixed-money value, say, 40 cents per hundred-weight of milk. This rate remains unchanged until direct action is taken to alter it. Under the percentage basis, a rate is fixed as a percentage of some amount, for example, spring blend prices. Percentage rates are used in Louisville, Duluth-Superior, and Omaha.

Although only three cities use the percentage basis, it has several advantages over fixed-money rates established by direct action. The foremost of these is that it raises and lowers money rates in proportion to changes in the general level of milk prices.

This is illustrated in table 8 which shows that changes in ratios of spring to fall prices are much less with percentage rates. This tends to keep changes in seasonal price relationships roughly in line with changes in seasonal cost differences. In other words, a percentage rate tends to hold the relative profitability of producing milk in different seasons approximately the same in spite of wide fluctuations in general levels of milk prices.

The direct procedure also has the disadvantage that rate changes, especially in regulated markets, take time and may create conflicts among producers. Since every rate change benefits some producers

Table 8.—Estimated average spring and fall blend prices under selected fall premium plans based on data of table 6

I Pool No. 1, Prices A

Accumulation rate	Blend Prices		Fall-spring price ratio
	Spring	Fall	
20 cents ¹ -----	\$4. 3273	\$5. 3591	123. 8
40 cents ¹ -----	4. 1273	5. 6091	135. 9
12 percent basic ¹ -----	4. 0473	5. 7091	141. 1
10 percent blend ¹ -----	4. 0746	5. 6750	139. 3

II Pool No. 2, Prices A

20 cents-----	\$4. 1454	\$5. 1318	123. 8
40 cents-----	3. 9454	5. 3818	136. 4
12 percent basic-----	3. 8654	5. 4818	141. 8
10 percent blend-----	3. 9109	5. 4249	138. 7

III Pool No. 2, Prices B

20 cents-----	\$4. 3636	\$5. 7227	131. 1
40 cents-----	4. 1636	5. 9727	143. 5
12 percent basic-----	4. 0836	6. 0727	148. 7
10 percent blend-----	4. 1072	6. 0432	147. 1

IV Pool No. 2, Prices C

20 cents-----	\$3. 0591	\$4. 0818	133. 4
40 cents-----	2. 8591	4. 3318	151. 5
12 percent basic-----	2. 8991	4. 2818	147. 7
10 percent blend-----	2. 9332	4. 2392	144. 5

¹ Fall premium plans assumed to have the second quarter as the accumulation period and the fourth quarter as the fall premium period with the accumulation rates shown.

and injures others, it will usually be supported by some and opposed by others. On the other hand, a percentage rate, which actually is a simple pricing formula, has all the administrative advantages of other milk pricing formulae.

Two types of percentage rates are now used. The Duluth and

Omaha plans provide for accumulation rates approximately equal to 8 percent of spring blend prices. The Louisville plan fixes the rate at 12 percent of the average of the basic formula prices of the preceding calendar year.

The relative merits of these two rate bases seem to be about equal.

Both perform the important function of keeping accumulation and premium rates in line with movements in the general level of milk prices. A rate based on blend prices also varies with every change in factors affecting blend prices, including changes in proportions of milk used in the several use classes and in relative class prices. However, as table 8 indicates, in spite of large changes in these factors the stability of seasonal blend price ratios is about the same for both types of percentage rates. This stability may encourage long-time planning of seasonal production programs by farmers which, in turn, may be expected to increase the effectiveness of a fall premium plan.

A minor weakness of a percentage accumulation rate based on blend prices is that it reduces (increases) the dollar amount of the rate when blend prices fall (rise). Such an offset, as previously noted, is highly desirable when changes in blend prices are the result of changes in the general level of milk prices. The offset, however, may not be desirable if a change in the seasonal pattern of milk deliveries is the cause of the movement in blend prices. In the latter situation, it may be argued, the accumulation rate in dollar amount ought, as a minimum, to be held unchanged.

The foregoing arguments, although valid, overemphasize the importance of this automatic offset to blend price changes and accord insufficient recognition to the magnitude of the price changes themselves. A simple example will illustrate this:

Assume Class I and II prices of \$6 and \$4, respectively, and Class I uses of 75 percent of total uses. The producer blend price then is \$5.50 which is reduced by a 10 percent accumulation rate to \$4.95. A decline in Class I uses to 50 percent would cause the blend price to fall to \$5 before the accumulation rate and to \$4.50 afterwards. In other words, the percentage rate based on blend prices would offset the decline in the blend price under these conditions only 5 cents, or 10 percent. In practice, such a small offset—smaller with lower percentage rates—probably would not greatly affect milk producers' seasonal production plans.

A minor disadvantage of the Louisville rate is its inherent lag of 7 to 13 months between the time it is determined and the time it is effective.¹⁸ Sizeable price changes can occur in a period this long. This weakness obviously would be removed by using current instead of past basic formula prices as the rate base. On the other hand, a rate based on current blend prices may fluctuate because of purely temporary production and marketing conditions having little relation to long-time seasonal pricing and production programs.

One reason advanced for using an average of prices of the previous calendar year rather than blend prices is to permit advance notice (in January) of the amount of the rate. This supposedly gives producers opportunity to adjust

¹⁸ The Louisville accumulation period ends in July, 7 months from the end of the preceding calendar year. A lag of 13 months is possible if the average of prices in a calendar year are assumed to be centered at July 1st of that year.

production plans during the year. Advance notice of only a few months, however, seems insufficient time for producers to make and carry out appreciable changes in breeding plans, the principal farm practice affecting seasonal production patterns. If, on the other hand, it is objected that the Duluth plan provides no advance notice of future spring-fall price relationships, this is valid only if these relationships are conceived in fixed-dollar terms.

From the foregoing it appears that the two types of percentage accumulation rates are about equal in over-all merit and that both are superior to a fixed-dollar rate.

Two other problems in the design of the accumulation rate provision are: (1) Avoiding sharp seasonal price breaks and (2) preventing blend prices from falling below prices in competing markets each spring. When accumulation rates are high there may be a sharp decline in milk prices in the first month of the accumulation period. There may be an equally sharp rise in the blend price in the month immediately following this period. Whether or not such large price changes are justified depends largely on the seasonal pattern of milk deliveries. Presumably, extraordinarily large monthly changes in deliveries justify large inverse changes in blend prices. On the other hand, the delivery pattern may not warrant large price fluctuations.

In this case, three means of avoiding sharp price breaks are available.

Accumulation rates may be kept relatively low. This, however, may

prevent the fall premium plan from providing adequate seasonal price incentives.

Several markets provide for a decrease in Class I prices beginning in the month prior to the accumulation period and continuing through the month following this period. The effect of this procedure is to step blend prices down each spring in a two-month period rather than in only one month, and similarly to raise them each summer in two steps.

Comparable effects are obtained in Washington by varying accumulation rates as follows: 50 cents in April and June and 75 cents in May. A similar procedure could be used with percentage rates. For example, April and June rates might be 8 percent of blend prices in these months and the May rate might be 12 percent. Even more gradual changes might be made with a longer accumulation period and, say a 4-percent rate in March and July, an 8-percent rate in April and June, and a 12-percent rate in May. Selection of an accumulation rate provision, no matter what it is, should be based on careful study of production and marketing conditions.

The problem of providing adequate seasonal price incentives while preventing blend prices each spring from falling below prices in competing markets, may be serious in some markets. If competing markets vary producer prices only slightly seasonally, a city may not be able to provide adequate seasonal price incentives, and the accumulation rate may have to be quite small. A city usually can do little to modify such a situation.

One possible solution to the problem may be to increase the annual average Class I price. This will raise blend prices and permit a larger accumulation rate without danger of letting blend prices fall below prices in other markets each spring. However, such action is subject to the limitation that the resulting increase in the annual average blend price may attract far more than an adequate supply of milk to the market in all seasons.

Up to this point, specific recommendations have not been made on minimum, maximum, or most desirable accumulation rates. The primary reason for this is that fall premium plans operate under widely diverse production and marketing conditions. An adequate rate in one market may be either much too high or too low in another. In several markets, now using fall premium plans there is little doubt that accumulation rates could be higher than they now are. It is also probable that if these rates were increased these fall premium plans would be more effective in reducing spring in relation to fall milk production.

Study of the effectiveness of the plans in the eight markets which have had fall premium plans 4 or more years leads to the tentative conclusion that accumulation rates equal to 8 percent of spring blend prices probably would not be too high in most instances. This is because an 8-percent rate generally will not cause fall blend prices to exceed spring blend prices by more than about 40 percent (table 5 on page 18). In some cities, higher rates might be justified. For ex-

ample, the average of the 1951 accumulation rates in Washington, D. C., were more than 10 percent of 1951 average spring blend prices prior to deduction of these rates.

Premium Months

Selection of fall premium months is basically a question of when blend prices should be increased each year. Existing fall premium plans provide for premium periods of 2, 3, and 4 months duration. In all cases, October and November are premium months and only one market uses all 4 months, September through December. For any given market, selection of premium months should be based on careful study of its milk delivery pattern and should be consistent with the over-all seasonal pattern of prices preferred.

Two other considerations are also involved. These are: (1) degree of continuity of seasonal price changes and (2) lengths of the accumulation and premium periods. The first of these is discussed below in connection with premium rates. The second is important because it affects the size of premium rates.

If the accumulation period is equal to or longer than the premium period, premium rates will be higher than if the premium period is the longer. An exception to this is the scheme of relating accumulations to premiums used in the Washington market. Thus, the length of the premium period affects the seasonal range in blend prices. Also, milk producers may have difficulty understanding why an accumulation rate of, say, 20 cents provides a premium rate of only,

say, 18 cents. In spite of the correct explanation that the accumulation period was only, say, 2 months in length while the premium period was 3 months long, some farmers may think that total premiums were less than total accumulations. The solution to this problem appears to be either to make the accumulation period equal to or longer than the premium period or to conduct an educational program among producers.

Premium Rates

Fall premium rates are computed under most plans by (1) dividing the premium fund by the number of delivery periods in the premium period; and (2) in each delivery period, dividing this allocation by the hundredweight of milk delivered by producers. Although there seems to be no alternative for the second step in this procedure, several means of allocating the premium fund may be used. The reason for disbursing premium money in equal monthly amounts is not clear. It may be the common method simply because the original Louisville plan provided for it.

Equal distribution may cause prices to producers to change sharply at the beginning and end of the premium period while remaining comparatively unchanged during the period. From the standpoint of the seasonal delivery pattern and of the over-all pricing pattern most suitable for the market such sharp price changes may or may not be desirable.

One consequence of an incorrect pattern of prices may be shifts over a period of years in seasonal milk production patterns. Some changes

in the fall premium plan then would be necessary. Two types of changes might be made: (1) lengthening the premium period and (2) varying proportions of the premium fund disbursed among the premium months.

Table 9 shows the nature and effects of one of several plans which might be used, based on data of the New Bedford market. No claim is made that this particular method is ideal, but it does appear to be an improvement in this case. The New Bedford plan caused two large price changes in the 1950-51 period at the beginning and end of the premium period of 73 and 76 cents per hundredweight. Under the alternative plan, these movements are each made in two steps with a maximum month-to-month change of 48 cents.

The alternative plan also makes price changes anticipate delivery changes by about 1 month. This may be sound because farmers receive milk checks nearly a month after deliveries have been made. Some farmers may associate prices received with conditions in the month when their checks came rather than with conditions in the previous month.

Another method of allocating premiums so as to avoid sharp seasonal breaks and plateaus in blend prices is used in Washington, D. C. This involves a combination of variable accumulation rates and matching premiums paid each fall month with money accumulated in a designated spring month. Thus, the accumulations in April and June at 50 cents a hundredweight are disbursed in October and De-

Table 9.—Comparison of announced blend prices and blend prices under an alternative plan of allocating fall premiums, New Bedford, 1950-51

Month	Milk deliveries from producers daily in hundred-weight	Present plan		Alternative plan	
		Percent of fund disbursed	Prices to producers in dollars per hundred-weight	Percent of fund disbursed	Prices to producers in dollars per hundred-weight
August 1950.....	1, 125	0. 0	\$6. 09	0. 0	\$6. 09
September 1950.....	1, 100	. 0	6. 11	10. 0	6. 25
October 1950.....	1, 045	33. 7	6. 84	25. 0	6. 72
November 1950.....	1, 029	32. 6	6. 84	30. 0	6. 80
December 1950.....	1, 028	33. 7	6. 81	25. 0	6. 68
January 1951.....	1, 043	. 0	6. 05	10. 0	6. 20
February 1951.....	1, 052	. 0	6. 07	. 0	6. 07

Source of basic data: Market Administrator, New Bedford, Mass., Milk Marketing Area.

cember, respectively. The May accumulation at 75 cents is paid out in November.

This procedure has been quite effective in recent years in moving blend prices more or less steadily upward and downward seasonally in the Washington market. The method, however, has one minor weakness which may cause difficulties in years when weather conditions are abnormal. For example, a brief but severe drought in June, by reducing premiums in December, might cause December prices to drop sharply from November and be too near January prices. This unusual situation can be avoided if the distribution of premium funds is based on percentages, equal or unequal, of the whole fund. The effects of unusual weather or other factors in one spring month then would be diffused over several fall months.

Paying Fall Premiums

The method of paying fall premiums is a minor problem on which there has been much controversy. Premiums are paid by special checks in five markets.

Proponents of special premium checks maintain that they are excellent educational devices.¹⁹ They demonstrate to milk producers the financial advantages of fall milk production. When producers are reminded often and forcefully of the value of fall milk production their responses to premiums are likely to be greater than would be otherwise probable. The success of a program to reduce seasonal fluctuations in milk production requires an educational program to supplement

¹⁹ Roberts, J. B. *The Louisville Fall-Premium Plan for Seasonal Milk Pricing*. 75 pp. Ky. Agr. Expt. Sta. Bul. 510, p. 40, Lexington, 1947; also testimony of producers and handlers at hearings on Federal Order No. 46 (Louisville).

price incentives. Milk producers have testified to the educational values of the special checks and some cooperative leaders have insisted that the special checks improve operation of the plan.

Opponents of special premium checks argue that (1) educational values of the checks have been exaggerated, (2) costs of distributing the checks are high, and (3) the whole procedure gives producers erroneous concepts of the true nature of fall premium plans. The opposition argues also that educational benefits can be obtained more easily by other means.

Costs of disbursing the special checks vary considerably among markets. One market reports a cost of about 19 cents a check and another about 11 cents. Total costs of three or four special premium checks per producer may easily be several thousand dollars in a large market.

The argument that special premium checks convey erroneous impressions to producers of the nature of a fall premium plan may be the most serious of the objections. A fall premium plan is a pricing plan, no more and no less. The premium fund is only a minor, but necessary, part of the whole milk pricing system. Payment of premiums by special checks may cause producers to feel that they have personal rights to the fund before they earn their share by their fall milk deliveries. Some marketing leaders prefer to play down the premium fund saying that it serves only to vary blend prices while leaving handlers' buying and selling prices seasonally constant.

Objective appraisal of the foregoing arguments leads to the conclusion that the method of paying premiums is quite unimportant. Markets using separate checks do not seem to have more effective premium plans than markets which include premiums in announced blend prices. Special checks increase administrative costs, but this increase is negligible when compared with total amounts of premiums paid and with total costs of market administration.

Investment of Premium Funds

The money accumulated in fall premium funds is held, on the average from 5 to 6 months. In most markets, this money has been held in commercial bank demand deposits. Two markets, in 1951, however, invested funds to earn small interest incomes. New Bedford earned one percent per annum on its savings account in a local bank. The Duluth-Superior market purchased U. S. Treasury bills then yielding about $1\frac{1}{4}$ percent per annum.

At the present time U. S. Treasury bills, yielding about $1\frac{1}{2}$ percent, and U. S. Intermediate Credit Bank debentures, yielding nearly 2 percent, are two of the several types of securities which seem highly suitable for investment of fall premium funds. They can be purchased readily through local banks to mature at the approximate dates when fall premiums must be paid. The interest rates, while not high, are generally above rates on alternative investments with comparably low risk.

A large market earning interest

on its fund at the rate of 2 percent per annum for 6 months could increase its fund by several thousand dollars. Viewed in this light, it seems wasteful not to put the money "to work." On the other hand, the earnings are not likely to increase fall premiums more than one-half cent per hundredweight. Whether or not premium funds ought to be invested at interest depends, to a considerable extent, on how the earnings are viewed, in an absolute or a relative sense. In any case, milk producers' gross earnings will be affected only slightly.

Other Questions

In discussions of fall premium plans, farmers and leaders of farmers' cooperatives have raised several interesting questions in addition to those discussed on preceding pages. Brief comments on these questions follow.

1. *Can a fall premium plan be used successfully in a market which is not regulated by a state or the Federal government?* Yes; in fact, two nonregulated markets, Washington, D. C., and Denver, Colo., have had fall premium plans since 1946 and 1948, respectively. In both markets, producers generally approve the plan and it has been successful in reducing seasonal variations in milk production (tables 1 on page 12, 2 on page 13, and 3 on page 14). However, to operate successfully in a nonregulated market a plan probably must be administered by a single relatively strong producers' bargaining cooperative. This association also requires the confidence of distributors in its ability to administer the plan properly.

2. *Can a fall premium plan be used in a market which pools milk on an individual-handler basis?* Yes; this is the system of pooling in Connecticut where a fall premium plan has been used since 1946. Basic requirements, if handlers were to administer a plan, would be an effective audit and performance bonds. In practice this probably would require administration by a governmental agency or a strong producers' association.

3. *Can accumulated and premium rates be made applicable to Class I milk uses rather than to total milk deliveries?* There is no reason why this cannot be done. In fact, a somewhat similar procedure is being used in Columbus, Ohio. The advantage of this procedure over the one commonly used, however, is by no means clear, and there may be none. This method requires higher accumulation rates to provide a certain pattern of blend prices because Class I uses in the spring are substantially less than total uses in most markets.

4. *Can a fall premium plan be added to or made a part of a base-surplus plan?* This can be done and it would increase price incentives for fall milk production.²⁰ The chief drawback to this proposal is that it would increase the complexity of the pricing structure in a market. Furthermore, in view of the fact that properly designed fall premium or base-surplus plans can

²⁰ Quackenbush, G. G., and Homme, H. A., *Seasonal Price Incentives of the Base and Excess Plan in the Detroit Milk Market*, 41 pp., Mich. Agr. Expt. Sta. Tech. Bul. 228, East Lansing, p. 21 3, 1952, show how such a combination plan might affect seasonal price incentives in the Detroit market.

provide adequate price incentives for fall milk production, complicating a market's pricing system with a combination plan seems both unnecessary and undesirable.

5. *Should producers be paid premiums if they were not delivering milk to the market during the previous accumulation period?* This question is based on a misconception of the nature of a fall premium plan. The question implies that the money accumulated each spring is taken out of each individual farmer's milk check. This, in turn, implies that each producer has an equity in the premium fund equal to the amount "taken out," and that since new producers have no such equity they are not entitled to share in the premiums. This concept carried to its logical conclusion would require that premiums paid each producer equal exactly the money "taken away" from him the previous spring. This obviously would defeat the purpose of the plan.²¹

In spite of the terms "take-out" and "pay-back" used by the originators of the fall premium plan, they never conceived it as an individual-producer plan. They properly conceived it as a market-wide pricing plan.²² The premium fund is owned by producers as a *group*. Producers share it only in the proportion that their milk deliveries in selected fall months are of total deliveries from all producers. In

fact, a fall premium plan may be conceived as a substitute for large variations in class prices. In lieu of low Class I prices in the spring and high Class I prices in the fall, distributors pay an average price in all seasons. Differences between what they pay under the fall premium plan and what they would pay under a seasonal class price plan providing comparable blend prices are simply put into a premium fund each spring and disbursed from that fund each fall. If accumulation and premium rates were based on Class I uses instead of total uses the similarities and differences between the two pricing plans would be obvious.

It is sometimes argued that producers who enter a market at the beginning of the fall premium period and leave before the beginning of the accumulation period in effect "raid" the premium fund at the expense of producers who remain in the market in all seasons. It is true that such action tends to decrease premiums and blend prices during the fall premium period, but this is only one side of the argument. Producers who remain in the market in all seasons benefit during the accumulation period through higher blend prices when other producers leave the market. Furthermore, the market as a whole gains in terms of a reduced seasonal variation in total milk receipts from producers. Finally, this whole problem of "fund raiding" may easily be exaggerated since data on numbers of producers in markets with fall premium plans indicate that seasonal variations in numbers have been slight in recent years. Factors

²¹ Roberts, J. B., *The Louisville Fall-Premium Plan for Seasonal Milk Pricing*. 75 pp. Ky. Agr. Expt. Sta. Bul. 510, p. 73, Lexington, 1947, concurs.

²² Roberts, J. B., *The Louisville Fall-Premium Plan for Seasonal Milk Pricing*. 75 pp. Ky. Agr. Expt. Sta. Bul. 510, pp. 71-3, Lexington, 1947; and hearings on Federal Order No. 46 (Louisville).

other than fall premium plans probably are more important in determining numbers of producers in a market at any given time. For these reasons, there should be no refusal to pay premiums to producers who were not delivering milk to the market during the accumulation period.

6. Are fall premium plans legal? This is a moot issue. The legality of the plans has not yet been tested in the courts. Certainly, however, if fall premium plans are conceived simply as seasonal pricing mechanisms as described elsewhere in this report, there would seem to be nothing illegal about them. Leaders of several bargaining associations report that their attorneys have stated that the plans are legal. Therefore, until a court test is made, it is not unreasonable to assume that fall premium plans are legal pricing devices.

7. Is an educational program essential to the success of a fall premium plan? There can be no doubt that an educational program among milk producers is a necessary supplement to a fall premium plan. It is doubtful if a plan can function successfully without such a pro-

gram. First, a producers' association must obtain the consent of a majority of its members to initiate a plan. To do this, the proposed plan must at least be explained to farmers. Second, farmers are likely to respond more fully to the incentives created by a plan if they understand it and know how to take advantage of these incentives. Third, there are always a few new members coming into an association who need information on the nature and operations of a plan.

All leaders of cooperatives interviewed in the course of this study firmly believe in the value of educational programs with the farmers they represent. Both before and since fall premium plans were established in their markets they have used a number of means of informing farmers on their plans. Among these techniques and devices are: (1) annual association meetings, (2) special and district meetings, (3) personal visits by association and handlers' fieldmen and others, (4) articles in regular association publications, and (5) special premium checks or special memoranda accompanying regular milk checks.



Other Publications Available

Agricultural Cooperation in the United States. Bulletin 54. *Ward W. Fetrow.*

Using Your Fluid Milk Co-op. Circular E-14. *Harry Trelogen.*

Using Your Co-op Creamery. Circular E-6. *Paul E. Quintus.*

Butter Pricing by Iowa Creameries. Circular C-136. *A. G. Mathis and Donald E. Hirsch.*

Farm-to-Plant Milk Hauling Practices of Dairy Cooperatives. Bulletin 69. *Joseph M. Cowden.*

Base Surplus Plan in the Madison, Wis., Milk Market. Miscellaneous Report 136. *Noel G. Stocker and Irwin R. Hedges.*

An Analysis of the Base-Quota Plan in the Memphis Milkshed. Miscellaneous Report 131. *Hans G. Hirsch and Irwin R. Hedges.*

Formula Pricing of Milk for Fluid Use. Miscellaneous Report 127. *Edmond S. Harris and Irwin R. Hedges.*

Dairy Cooperatives and Large-Scale Plants. Miscellaneous Report 155. *Donald E. Hirsch.*

Copies of these publications may be obtained upon request while a supply is available from the

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